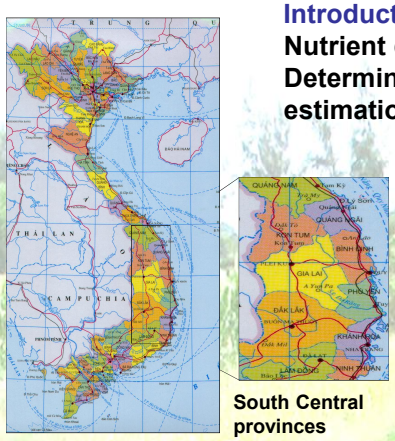
Assessment of nitrogen mineralization of organic materials on sands of Central Vietnam: incubation experiments

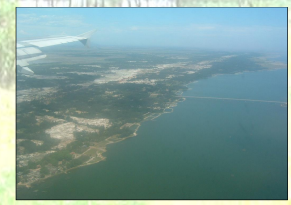
Hoang Thi Thai Hoa, Tran Thi Anh Tuyet, Do Dinh Thuc Surrender Mann and Richard Bell
(1) Hue University of Agriculture and Forestry, Hue city, Vietnam *(2) Murdoch University, Western Australia*

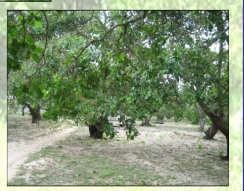


South Central provinces

Introduction: Sandy soil in South Central Coastal Vietnam
Nutrient deficiencies, acidity, low water holding capacity and wind erosion risk.
Determine the nitrogen mineralization potential of a sandy soil is needed, for better estimation of the optimum nitrogen fertilizer demand by crops.

Main crops: Rice, peanut, cassava, legumes, cashew, mango…





Objective: Assess the effect of added organic manures on the short-term gross N mineralization in coastal sands of Central Vietnam

Materials and methods

Table 1: Soil characteristics before experiment

pH_{H2O}	pH_{KCl}	EC µS cm^{-1}	OC %	N %	P_2O_5 %	K_2O %	CEC cmolc kg^{-1}
6.00	4.76	13.1	0.84	0.019	0.019	0.14	0.80

Table 2. Properties of organic matters used in the incubation experiment

Properties	DM (%)	pH_{KCl}	C (%)	N (%)	NH_4^+ (mg/kg)	NO_3^- (mg/kg)
Cattle dung in open compost heap on soil (CFH)	36.3	7.95	38.4	0.81	62.0	235.6
Cattle dung + rice straw from farmer household (1:1 ratio) in compost pit in brick enclosure covered with plastic (CFP)	35.9	7.84	39.9	1.16	72.0	233.5
Cattle dung + rice straw (1:0.5) in compost heap on compacted earth covered with plastic (CTH)	30.3	8.19	33.9	0.85	43.2	314.1
Cattle dung + rice straw (1:0.5) in compost pit in brick enclosure covered with plastic (CTP)	36.2	8.02	36.8	1.15	61.2	696.0

Results

- The addition of organic fertilizers resulted in an increase of the N mineralization (Figure 1).
- The increase of N mineralization rate is more significantly marked with compost made in a pit compared to soil before experiment and composting in heap, and generally most marked at the initial period of incubation.

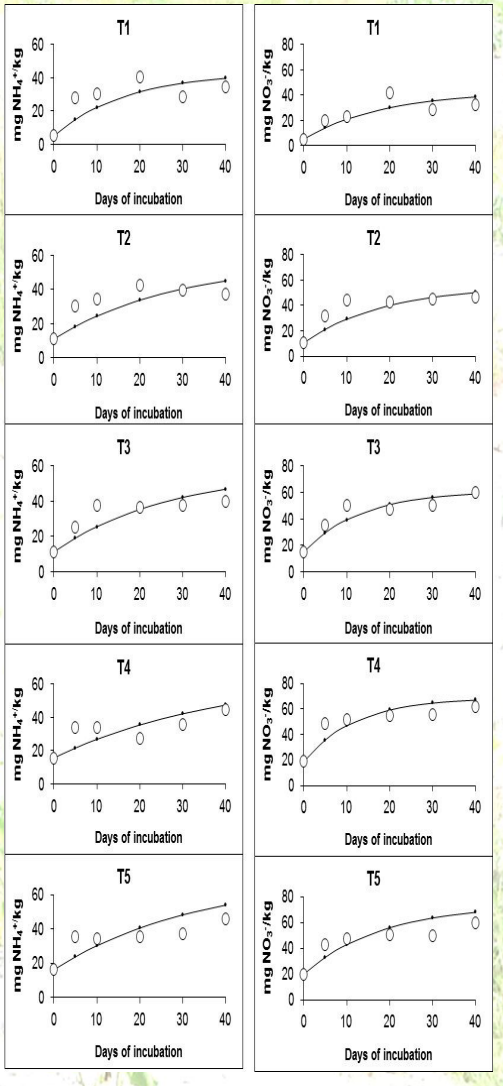


Figure 1. NH_4^+-N and NO_3^- - N extracted from soils as a function of incubation time

Conclusions

Mineralizable-N was usually higher for manure-treated soils than the control. Short term N-mineralization was much smaller than the total N content. Further study to better assessment of native fertility of these soils and proper techniques for optimum management of organic matter in local farming systems.

Acknowledgements
The studies have been funded by the Australian Centre for Agriculture Research (ACIAR) in the frame of project of SMCN/2007/109/2.